

amount of the crystalline fraction required to give the progestational reaction has not yet been determined but the yield in terms of rabbit units is low as compared with the activity of the original extract. However, the activity of the material is very high when calculated on the dry weight of the crystals, much higher than any other preparation we have thus far obtained. At present we do not know that the crystals are the pure hormone but the activity seems, at least, to be closely associated with them.

The uteri of rabbits, which show pronounced progestational modification as a result of treatment with the crystalline preparation, continue to give a strong response to pituitrin. (Details will be reported by M. A. Foster.) This is in direct contrast to the response of the uteri of pregnant and pseudopregnant rabbits or those which have received crude corporin preparations.^{2, 3, 4, 5}

6004

Effects of Administration of Cortical Adrenal Extract to the Hypophysectomized Anuran.

WAYNE J. ATWELL.

From the Department of Anatomy, University of Buffalo.

Among the results of early hypophysectomy in the anuran larva is marked underdevelopment of the thyroid gland and the adrenal cortex.¹ The resulting condition of the sex-glands has not been adequately studied in amphibia although it is well known for mammals.² In attempting to analyze this fairly complex glandular situation from a functional viewpoint it seems important to determine what effects are due primarily to absence of the hypophysis and what secondarily, through impairment of the thyroid, the adrenal cortex, or possibly the gonads. The relationship of the thyroid has been rather definitely established by the following observations: (1) anterior pituitary substance to hypophysectomized tadpoles stimulates the atrophic thyroid and induces metamorphosis; (2) thyroid substance to hypophysectomized tadpoles produces metamorphosis;

² Knaus, H., *Arch. f. Gynäk.*, 1930, **2**, 141.

³ Knaus, H., *Arch. f. Exp. Path. u. Pharm.*, 1930, **5**, **6**, 151.

⁴ Reynolds, S., *Am. J. Phys.*, 1931, **2**, 98.

⁵ Robson, J. M., and Ellingworth, R. E., *Quart. J. Exp. Phys.*, 21, **1**, 93.

¹ Smith, P. E., *Am. Anat. Mem.*, 1920, **11**.

² Smith, P. E., *Am. J. Anat.*, 1930, **45**, 205.

(3) pituitary substance to hypophysectomized tadpoles which also have been thyroidectomized does not cause metamorphosis.^{1,3} It is clear that the hypophysis works through the thyroid in this particular reaction.

The functional relationships of the adrenal cortex are not so well known, although it has been shown that pituitary administration restores the atrophied adrenal cortex of the hypophysectomized animal.^{1,2} Due to its diffuse nature and its intimate anatomical relation to the mesonephros, the amphibian adrenal is not suitable for experimental removal. Until the recent work of Hartman *et al.*,⁴ and of Swingle and Piffner⁵ a potent extract of the adrenal cortex was not available. A relation of the adrenal gland to sex function is suggested by numerous clinical and pathological observations.⁶ Nice and Shiffer⁷ report early opening of the vaginal canal. Corey and Britton⁸ induced precocious sexual maturity in the rat. There was hypertrophy of the hypophysis in 20-day rats. It is suggested that the cortical adrenal extract acted through the hypophysis. Connor⁹ was unable to confirm the work of Corey and Britton and found that watery extracts of the adrenal cortex contain a substance which inhibits the activity of the gonads of mature animals. Freed, Brownfield and Evans¹⁰ report degeneration of the testis following adrenalectomy in the white rat, either mature or immature.

Larvae of *Rana sylvatica* were hypophysectomized at the tail-bud stage. At different ages thereafter groups of animals were given cortical adrenal extract (Hartman) by intraperitoneal injection, using special fine hypodermic needles. Female animals treated for a period of about 2 months beginning at 5 months of age show a definite stimulation of the ovaries. Younger animals treated for periods of 2 or 3 weeks did not exhibit this effect. The ovaries of treated animals average $2\frac{1}{2}$ times the size of those from hypophysectomized untreated controls. Thirty specimens of *Rana sylvatica* were used. Of these 15 received cortical extract. Fourteen were silvery (hypo-

³ Allen, B. M., *Quar. Rev. Biol.*, 1929, **4**, 325.

⁴ Hartman, F. A., Brownell, K. A., and Hartman, W. E., *Am. J. Physiol.*, 1930, **95**, 670.

⁵ Swingle, W. W., and Piffner, J. J., *Am. J. Physiol.*, 1931, **96**, 153.

⁶ Barker, L. F., and Hoskins, R. G., *Endo. and Metab.*, 1922, **2**, 345.

⁷ Nice, L. B., and Shiffer, A. L., *Endocrinology*, 1931, **15**, 205.

⁸ Corey, E. L., and Britton, S. W., *Science*, 1931, **74**, 101; *Am. J. Physiol.*, 1931, **99**, 33.

⁹ Connor, C. L., *Proc. Soc. Exp. Biol. and Med.*, 1931, **29**, 131.

¹⁰ Freed, S. C., Brownfield, B., and Evans, H. M., *Proc. Soc. Exp. Biol. and Med.*, 1931, **29**, 1.

physectomized) controls; 1 was a dark (normal) control. In addition many normal controls of other series were available for comparison.

Histologically untreated animals show ovaries with large ovocytes in the central part of the gland but with much interstitial tissue and a cortex which appears to be relatively quiescent in that it consists of many ovogonia and only small numbers of ovocytes. The ovaries of treated animals, on the other hand, are distended with many large ovocytes located in the cortex as well as centrally. The interstitial tissue and the residual nests of ovogonia in the cortex are reduced to relative insignificance. The whole histological picture is that of recent enlargement of numerous ovocytes in the cortex of the gland.

The adrenal seems to be somewhat restored by administration of cortical extract in that the cortical cells seem larger, and definitely to contain more lipid material as shown by treatment with osmic acid. The medullary cells in the treated animals constitute a smaller proportion of the gland. Whether this is relative only, due to enlargement of the cortical cells or to actual reduction of the size of the medullary cells has not been determined.

There is no effect on pigmentation, growth, differentiation or upon the thyroid gland. The effect on the male gonad has not been studied.

6005

The Examination of Urine for Indol.

STUART L. VAUGHAN. (Introduced by R. S. Hubbard.)

From the Buffalo General Hospital, Buffalo, N. Y.

Recently it has been suggested¹ that failure of the liver to conjugate indol may lead to an excretion of that substance in the urine. It was therefore decided to investigate the probable value of the demonstration of indol in the urine as a method of determining the relative efficiency of liver function. In addition to a series of patients with clinical evidence of liver disease others showing marked signs of intestinal putrefaction were studied because it was felt that the large amounts of indol formed in such conditions might overtax the detoxifying power of the liver and so lead to the excretion of the unaltered compound in the urine. Simultaneously

¹ Kendall, A. I., *Arch. Path.*, 1931, **12**, 95.